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Tom Weidner

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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/659,230  
Filing Date: September 10, 2003  
Appellant(s): WEIDNER, TOM

\_\_\_\_\_  
Mr. Steven H. Noll, reg. no. 28,982  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 16 January 2007 appealing from the Office action  
mailed 19 July 2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,831,986	Kates	12-2004 (Filed 8-2002)
6,072,884	Kates	1-2000
6,404,895	Weidner	6-2002

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

**Claims 1, 10 through 12, 14 through 36, 45 through 47 and 49 through 69 are rejected under 35 U.S.C. 102(e) as being anticipated by Kates (US Patent 6,831,986).**

Regarding Claim 1, Kates '986 discloses a feedback cancellation system (i.e., a feedback compensator) for use in a hearing aid (i.e., an acoustic amplification system) (Fig. 4) comprising: an adaptive filter 401 that corresponds to the adaptive feedback compensation filter claimed, is supplied as an input with the amplified output signal 425 and generates a compensation signal  $v(n)$  from the amplified output signal 425, the compensation signal  $v(n)$  being combined with the input signal  $s(n)$  in summing junction 409; and a filter 419, that models the resonance of the feedback path (column 8, lines 13-15) and, as such, corresponds to the frequency limiting filter claimed and is connected relative to the adaptive filter 401 that corresponds to the adaptive feedback compensation filter claimed, limits the frequency range within which the compensation filter compensates feedback by frequency limiting the input to the adaptive filter 401 that corresponds to the adaptive feedback compensation from the amplified output signal 425 (column 8, lines 12-16) and can be changed slowly (i.e., is adaptable) during compensation (column 8, lines 16-18).

Regarding Claim 10, Kates '986 further discloses adapting the frequency select (i.e., frequency limiting) filters 421, 423 by analyzing an error signal (Fig. 5, step 507) that corresponds to the

Art Unit: 2615

feedback compensated input signal claimed according to a sequence that inherently requires an analysis unit (Fig. 5; column 8, lines 52-54).

Regarding Claim 11, Kates '986 further discloses adapting the frequency select (i.e., frequency limiting) filters 421, 423 by analyzing an error signal (Fig. 5, step 507) that corresponds to the filter parameter claimed (Fig. 5; column 8, lines 52-54).

Regarding Claim 12, Kates '986 further discloses cross correlating (i.e., comparing) filtered output signal  $f(n)$  and filtered input signal  $g(n)$  to determine adaptive filter updating (Fig. 5, steps 509, 511; column 9, lines 7-11).

Regarding Claim 14, Kates '986 further discloses an acoustic feedback path (Fig. 4, reference 417; column 8, lines 1-2).

Regarding Claim 15, while Kates '986 is silent as to the susceptibility of the input signal to electromagnetic feedback, the mere existence of such a susceptibility of the input signal is not limiting on the structure of the feedback compensator absent any recitation in the claim that the feedback compensator acts on the electromagnetic feedback. As such, Claim 15 is rejected on the same grounds as Claim 1.

Regarding Claim 16, Kates '986 further discloses an LMS adaptation unit (Fig. 4, reference 403; column 8, lines 35-38) that corresponds to the adaptation unit claimed dependent on a filtered

Art Unit: 2615

error signal  $g(n)$  and filtered feedback path signal  $f(n)$  (i.e., a signal within the acoustic amplification system).

Regarding Claims 17 and 18, Kates '986 further discloses an LMS adaptation unit (Fig. 4, reference 403; column 8, lines 35-38) that corresponds to the adaptation unit claimed dependent on a filtered error signal  $g(n)$ .

Regarding Claim 19, Kates '986 further discloses adapting the filter 421 that produces the filtered error signal  $g(n)$  (Fig. 5, step 503; column 8, lines 56-59).

Regarding Claim 20, Kates '986 further discloses adapting the frequency select (i.e., frequency limiting) filters 421, 423 according to a sequence that inherently requires a controller (Fig. 5; column 8, lines 52-54).

Regarding Claim 21, Kates '986 further discloses selection of individual bandpass filters by adjustment of cascaded individual notch filters (Fig. 8, reference 801, 803, 805, 807; column 10, lines 40-45) that correspond to the changeover switch claimed.

Regarding Claim 22, Kates '986 further discloses the adaptive frequency select (i.e., frequency limiting) filters 421, 423 having coefficients adapted to modify the filter function (column 8, lines 59-65).

Art Unit: 2615

Regarding Claim 23, Kates '986 further discloses the LMS adaptation unit (Fig. 4, reference 403; column 8, lines 35-38) that corresponds to the adaptation unit claimed receives output  $f(n)$  of the frequency select (i.e., frequency limiting) filter 423.

Regarding Claim 24, Kates '986 further discloses the LMS adaptation unit (Fig. 4, reference 403; column 8, lines 35-38) that corresponds to the adaptation unit claimed receives output  $g(n)$  of the frequency select (i.e., further frequency limiting) filter 421.

Regarding Claim 25, Kates '986 further discloses the adaptive frequency select (i.e., frequency limiting) filters 421, 423 having coefficients adapted to modify the filter function (column 8, lines 59-65).

Regarding Claim 26, Kates '986 further discloses adapting the frequency select (i.e., frequency limiting) filters 421, 423 according to a sequence that inherently requires a controller (Fig. 5; column 8, lines 52-54).

Regarding Claim 27, Kates '986 further discloses selection of individual bandpass filters by adjustment of cascaded individual notch filters (Fig. 8, reference 801, 803, 805, 807; column 10, lines 40-45) that correspond to the changeover switch claimed.

Art Unit: 2615

Regarding Claim 28, Kates '986 further discloses the adaptive frequency select (i.e., frequency limiting) filters 421, 423 having coefficients adapted to modify the filter function (column 8, lines 59-65).

Regarding Claim 29, Kates '986 further discloses a so-called frozen filter 419 that corresponds to the first frequency-limiting filter claimed and wherein the LMS adaptation unit 403 that corresponds to the adaptation unit claimed receives the input signal  $e(n)$  through a frequency select filter 421 that corresponds to the second frequency-limiting filter claimed and receives the output of the so-called frozen filter 419 that corresponds to the first frequency-limiting filter claimed through a frequency select filter 423 that corresponds to the third frequency-limiting filter claimed. Kates '986 teaches adaptation of the so-called frozen filter 419 at column 8, lines 16-29.

Regarding Claim 30, Kates '986 further discloses coefficients are copied from the frequency select filter 421 that corresponds to the second frequency-limiting filter claimed to the frequency select filter 423 that corresponds to the third frequency-limiting filter claimed (Fig. 5, step 505; column 8, lines 62-65).

Regarding Claim 31, Kates '986 further discloses the adaptive frequency select filters 421, 423 that correspond to the second and third frequency-limiting filters claimed having coefficients adapted to modify the filter function (column 8, lines 59-65).



Art Unit: 2615

Regarding Claim 32, Kates '986 further discloses adapting the frequency select filters 421, 423 that correspond to the second and third frequency-limiting filters claimed by analyzing an error signal (Fig. 5, step 507) that corresponds to the feedback compensated input signal claimed according to a sequence that inherently requires an analysis unit (Fig. 5; column 8, lines 52-54).

Regarding Claim 33, Kates '986 further discloses selection of individual bandpass filters by adjustment of cascaded individual notch filters (Fig. 8, reference 801, 803, 805, 807; column 10, lines 40-45) that correspond to the changeover switch claimed.

Regarding Claim 34, Kates '986 further discloses the adaptive frequency select (i.e., frequency limiting) filters 421, 423 having coefficients adapted to modify the filter function (column 8, lines 59-65).

Regarding Claim 35, Kates '986 discloses a hearing aid (Fig. 4) comprising: a microphone 407 that corresponds to the input transducer claimed and produces an input signal  $s(n)$  from an incoming acoustic signal  $x(n)$ ; a hearing aid processing unit 411 that corresponds to the hearing aid signal processor claimed and produces an amplified output signal 425, the input signal being influenced by a feedback via a feedback path 417; an adaptive filter 401 that corresponds to the adaptive feedback compensation filter claimed and generates a compensation signal  $v(n)$  that is combined with input signal  $s(n)$  in summer 409; a so-called frozen filter 419 that models the resonance of the feedback path (column 8, lines 13-15) and, as such, corresponds to the frequency-limiting filter claimed, limits the frequency range within which the compensation

Art Unit: 2615

filter compensates feedback (column 3, lines 30-34) and can be changed slowly (i.e., is adaptable) during compensation (column 8, lines 16-18).

Claims 36, 45 through 47 and 49 through 69 are essentially similar to Claims 1, 10 through 12 and 14 through 34, respectively, and are rejected on the same grounds.

Regarding Claim 50, while Kates '986 is silent as to the susceptibility of the input signal to electromagnetic feedback, the mere existence of such a susceptibility of the input signal is not limiting on the method of feedback compensation absent any recitation in the claim that the feedback compensation acts on the electromagnetic feedback. As such, Claim 50 is rejected on the same grounds as Claim 36.

**Claims 1 through 9, and 36 through 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Kates (US Patent 6,072,884).**

Regarding Claim 1, Kates '884 discloses a feedback cancellation (i.e., a feedback compensator) for use in a hearing aid (i.e., an acoustic amplification system) (Fig. 1) comprising: an adaptive filter 118 that corresponds to the adaptive feedback compensation filter claimed, is supplied as an input with the amplified output signal 108 and generates a compensation signal 120 from the amplified output signal 108, the compensation signal 120 being combined with the input signal 100 in summing junction 102; and a filter 114, that models the resonance of the feedback path (column 8, lines 51-54) and, as such, corresponds to the frequency limiting filter claimed and is

Art Unit: 2615

connected relative to the adaptive filter 118 that corresponds to the adaptive feedback compensation filter claimed, limits the frequency range within which the compensation filter compensates feedback by frequency limiting the input to the adaptive filter 118 that corresponds to the adaptive feedback compensation from the amplified output signal 108 (column 8, lines 51-55) and varies slowly (i.e., is adaptable) during compensation (column 7, lines 35-38).

Regarding Claim 2, Kates '884 further discloses the filter 114, that corresponds to the frequency limiting filter claimed being an IIR filter (column 4, lines 8-9). Because an IIR filter comprises a tapped delay line, each tap of which is weighted and summed with the other weighted taps, it inherently comprises of a plurality of individual filters that in combination form its filter function.

Regarding Claim 3, as stated above apropos of Claim 2, the individual weighted taps of the IIR filter have respectively different functions and are selectable by the weighting coefficients.

Regarding Claim 4, Kates '884 further discloses the filter 114, that corresponds to the frequency limiting filter claimed modeling resonant aspects of the feedback path (i.e., cover the feedback frequency range) (column 8, lines 51-55).

Regarding Claim 5, Kates '884 further discloses the filter 114, that corresponds to the frequency limiting filter claimed being an IIR filter (i.e., having coefficients) and being changed (i.e., adapted to modify the filter function) (column 7, lines 35-38).

Art Unit: 2615

Regarding Claim 6, Kates '884 further discloses the amplified output signal 108 supplied to the LMS adapter 122 of the adaptive filter 118 that corresponds to the adaptive feedback compensation filter claimed through the filter 114, that corresponds to the frequency limiting filter claimed.

Regarding Claim 7, Kates '884 further discloses the filter 114, that corresponds to the frequency limiting filter claimed being an IIR filter (i.e., having coefficients) and being changed (i.e., adapted to modify the filter function) (column 7, lines 35-38), which inherently requires a controller.

Regarding Claim 8, Kates '884 further discloses the filter 114, that corresponds to the frequency limiting filter claimed being an IIR filter (column 4, lines 8-9). Because an IIR filter comprises a tapped delay line, each tap of which is weighted and summed with the other weighted taps, it inherently comprises of a plurality of individual filters that in combination form its filter function with the individual weighting coefficients corresponding to the changeover switch claimed.

Regarding Claim 9, Kates '884 further discloses the filter 114, that corresponds to the frequency limiting filter claimed being an IIR filter (column 4, lines 8-9), inherently having coefficients adapted to modify the filter function.

Art Unit: 2615

Claims 36 through 44 are essentially similar to Claims 1 through 9, respectively, and are rejected on the same grounds.

**Claims 13 and 48 rejected under 35 U.S.C. 103(a) as being unpatentable over Kates '986 in view of Weidner (US Patent 6,404,895).**

Regarding Claims 13 and 48, as shown above apropos of the respective parent claims, Kates '986 anticipates all elements except performing feedback analysis by measuring feedback with an oscillation detector. Weidner discloses use of an oscillation detector to detect feedback in a hearing aid (column 2, lines 62-67). Weidner further discloses that such an arrangement is especially useful where the feedback frequency is to be determined. It would have been obvious to one skilled in the art at the time of the invention to apply measuring feedback with an oscillation detector as taught by Weidner to the feedback compensation taught by Kates '986 for the purpose of realizing the aforesaid advantage.

#### **(10) Response to Argument**

Anticipation of Claims 1, 10 through 12, 14 through 36, 45 through 47 and 49 through 69 by Kates '986 (US Patent 6,831,986)

On pages 10 through 15 of the appeal brief, appellant makes arguments regarding the correspondence of the so-called frozen filter (Figure 4, reference 419) taught in Kates '986 and the frequency-limiting filter recited in the claims. A comparison of Fig. 4 in Kates '986 and appellant's Fig. 1 (Exhibit A in the evidence appendix of the appeal brief) shows identical signal

Art Unit: 2615

processing topology for the respective feedback compensation systems. At the bottom of page 4 of the appeal brief, appellant characterizes this figure as depicting the feedback compensator claimed. Appellant does not dispute that the interconnection of signal processing elements is identical. Appellant only makes arguments as to the correspondence of these elements based on the recitation in the claims:

a frequency-limiting filter connected relative to said adaptive feedback compensation filter to limit a frequency range within which said adaptive feedback compensation filter compensates said feedback by frequency-limiting said input to said adaptive feedback compensation filter formed by said amplified output signal, said frequency-limiting filter having a filter function that is adaptable during compensation of said feedback by said adaptive feedback compensation filter

Because of the identical topologies of the claimed invention and the reference, the only questions here are whether the filter 419 in the reference is frequency limiting and adaptable during compensation. The reference discloses “when the hearing aid 400 is first turned on, filter (pole) coefficients of the frozen filter 419 are adapted to model those aspects of the feedback path that can have high-Q resonance but which stay relatively constant during normal hearing aid operation” (column 8, lines 12-16). The term “high-Q resonance” refers to sharp peaks in the frequency characteristic of the feedback path. This relates to the structure of the hearing aid itself. Like any other electronic, the hearing aid has certain frequencies at which it is most sensitive. These frequencies are most easily transmitted by the hearing aid from the hearing aid loudspeaker to the hearing aid microphone, causing audio feedback, a loud and undesirable

Art Unit: 2615

whistling or squealing. Filter 419 limits the frequencies that the feedback compensator operates on to these important frequencies. As such, it is a frequency-limiting filter, as claimed. Because these peak frequencies are related to the structure of the hearing aid itself, they remain relatively constant. However, as with any other device, pressure, temperature and humidity can cause changes in these frequencies. Because these conditions vary somewhat within a human ear, filter 419 is permitted to change slowly: "pole coefficients of the feedback path, once determined, are modified and then frozen or, at least, changed vary (sic) slowly" (column 8, lines 17-19). This disclosure certainly teaches some change in the function of filter 419. Further, the claim only requires "a filter function that is adaptable during compensation", not that the adaptation actually takes place. The indication of the possibility of modification in the reference certainly meets the reduced specificity of the claim limitation "adaptable".

In the paragraph spanning pages 10 and 11 of the appeal brief, appellant alleges that filter 419 is not an adaptive filter and lacks a control input. These elements are not claimed. Appellant submits "the fact that the filters 421 and 423 in the Kates '986 reference are explicitly called "adaptive filters", whereas this terminology was not used to describe the filter 419, clearly indicates that Kates '986 did not consider the filter 419 as being an "adaptive" filter, nor would a person of ordinary skill reading the Kates '986 reference". Yet the claim recites a separate element from the frequency-limiting filter as "an adaptive feedback compensation filter". This terminology (i.e., adaptive) is not used with respect to the frequency-limiting filter in the claim. As such, by appellant's own reasoning, appellant did not consider the frequency-limiting filter as

Art Unit: 2615

being an "adaptive" filter at the time the invention was made, nor would a person of ordinary skill reading the claim.

In the paragraph spanning pages 11 and 12 and the first complete paragraph on page 12, appellant continues this misdirection, insisting, irrelevantly, that Kates '986 does not teach that the filter 419 is an adaptive filter or a "true" adaptive filter", whatever that means.

At the beginning of the second complete paragraph on page 12, after repeatedly insisting the claim requires an adaptive filter, appellant suddenly reverses and submits (emphasis added):

The Examiner stated in the Final Rejection and in the Advisory Action that the claims are not limited to an adaptive filter, but merely require that the filter be "adaptable." *While that may be true*, the language of claim 1, for example, explicitly states that the frequency-limiting filter compensates the feedback by frequency-limiting the input to the adaptive feedback compensation filter formed by the amplified signal, and states that the filter function of the frequency-limiting filter is adaptable during this compensation. Appellant submits that the frozen filter 419 in the Kates '986 reference, according to the aforementioned passages, is explicitly stated to be incapable of performing such adaptable compensation.

In fact, the language of the claim does not require "that the frequency-limiting filter compensates the feedback by frequency-limiting the input to the adaptive feedback compensation filter". The claims clearly recites that it is the adaptive feedback compensation filter that compensates the feedback, not the frequency limiting filter.



In the paragraph spanning pages 12 and 13 of the appeal brief, appellant disingenuously alleges, “there is no teaching ... that such slow varying, if it occurs, has anything to do with compensating feedback”. Kates ‘986 discloses the filter 419 models portions of the feedback path (column 8, lines 27-29). The purpose of this modeling is to produce a feedback canceling signal ( $v(n)$  in Fig. 4 in Kates ‘986 or reference 8 in appellant’s Fig. 1). The combined action of filters 419 and 401 in Kates ‘986 operating on the hearing aid output 425 produces a duplicate of the leakage over the feedback path 417. By subtracting the duplicate from the input signal  $s(n)$ , the feedback is eliminated. This is exactly analogous to appellant’s invention where the combined action of filters 13 and 15 operating on the hearing aid output 12 produces a duplicate of the leakage over the feedback path 7. By subtracting the duplicate from the input signal 3, the feedback is eliminated. Since the only purpose of filter 419 is its role in feedback cancellation, the disclosed variation in its characteristic is involved in that function.

In the paragraph spanning pages 13 and 14 of the appeal brief, appellant alleges that filter 419 in Kates ‘986 models only fixed parameters and, as such cannot be adaptable during compensation, as claimed. Kates ‘986 discloses “filter 419 is a slowing-varying or non-varying (frozen) filter” (column 8, lines 5-6) and “coefficients of ... filter 419 are adapted to model those aspects of the feedback path that can have high-Q resonance but which stay *relatively constant* during normal hearing aid operation” (column 8, lines 13-16, emphasis added). This is because these aspects of the feedback path are related to the structural elements of the hearing aid, such as its microphone, amplifier and loudspeaker, as opposed to the more variable aspects of the feedback path, such as

Art Unit: 2615

the air spaces in the ear canal which change as the wearer moves, speaks and chews, for example. However, changes in, for example, temperature, pressure and humidity will cause slower variation in the *relatively* constant aspects of the feedback path. This is why Kates '986 discloses varying the characteristic of filter 419. Appellant further alleges that the absence of an explicitly disclosed control input in Kates '986 precludes adaptability during compensation. In fact, Kates '986 explicitly discloses "when the hearing aid 400 is first turned on, filter (pole) coefficients of the frozen filter 419 are adapted to model those aspects of the feedback path that can have high-Q resonance but which stay relatively constant during normal hearing aid operation" (column 8, lines 12-16). As such, all the elements necessary for adaptation of filter 419 are present and disclosed in Kates '986. So clearly, to adapt during compensation, or as Kates '986 discloses "changed vary (sic) slowly" (column 8, line 18) requires only activation of this existing and disclosed capability. Further, the presence of a control input for the frequency-limiting filter is not claimed.

On pages 14 through 15 of the appeal brief, appellant alleges that Kates '986 does not enable the claimed invention. Here appellant engages in mere allegation. The MPEP has this to say about showing failure of enablement:

There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue." These factors include, but are not limited to:

(A) The breadth of the claims;

Art Unit: 2615

- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;
- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and
- (H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

Appellant has ignored this guidance and simply alleged a failure of enablement. As such, it is unclear which aspects of appellant's claimed invention are alleged to be unenabled by the disclosure of Kates '986 and where these same aspects are enabled by appellant's disclosure.

In the second and third paragraphs on page 15 of the appeal brief, appellant alleges patentability of claims 10 through 12 and 14 through 34 based solely on their dependence from claim 1.

These arguments are unpersuasive for the reasons stated above.

In the paragraph spanning pages 15 and 16 of the appeal brief, appellant makes similar arguments with respect to Kates '884 as applied to claims 1 and 36. In this case appellant alleges that the all-pole or pole model filter 114 in Fig. 1 of Kates '884 does not correspond to the frequency limiting filter claimed. Yet appellant admits that Kates '884 discloses that filter 114 can vary slowly in response to adaptive signal 112 in response to error signal 104, feedback signal 108 or the like.

In the first complete paragraph on page 16 of the appeal brief, appellant alleges that filter 114 is precluded from being adapted during operation. Yet as appellant admits, Kates '884 discloses that filter 114 can vary slowly in response to adaptive signal 112 in response to error signal 104, feedback signal 108 or the like. These signals are clearly active during operation of the device since they control the zero model adaptive filter 118. Further Kates '884 discloses "adaptive signal 112 is shown in case pole filter 114 is not frozen, but rather varies slowly, responsive to adaptive signal 112 based upon error signal 104, feedback signal 108, or the like" (column 7, lines 35-38). As such, Kates '884 is clearly disclosing an embodiment where filter 114 is adaptable as claimed.

In the first and second complete paragraphs on page 17 of the appeal brief, appellant alleges patentability of claims 2 through 9, 13 and 48 based solely on their dependence from claim 1 or claim 36. These arguments are unpersuasive for the reasons stated above.

Finally, appellant appears to allege a fail of enablement by the Kates '884 reference with respect to the claimed invention. Again, it is unclear which aspects of appellant's claimed invention are alleged to be unenabled by the reference and where these same aspects are enabled by appellant's disclosure.

In summary, appellant ignores clear disclosures in the references as to the adaptability of the structures corresponding to the frequency-limiting filter claimed while simultaneously taking an

Art Unit: 2615

improperly restrictive view of the limitation “adaptable” by reading it as “adaptive” or “truly adaptive”.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



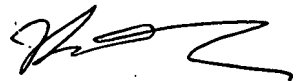
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